Bendix

Driver Instructions

Bendix™ VORAD® Collision Warning System

BW2861 (Formerly VODR0030)

October 2011

FCC Compliance Statement

Federal Communications Commission

This device is sold under a waiver of FCC (Federal Communications Commission) rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must be able to accept any interference received, including interference that may cause undesired operation. Any interference that may be caused should be reported to the local FCC field office or to the Federal Communications Commission; Field Operation Bureau; Enforcement Bureau; 445 12th Street S.W.; Room 7-C485; Washington, DC 20054.

Any changes or modifications made by the user to this equipment that are not expressly approved by Bendix Commercial Vehicle Systems LLC could void the user's authority to operate the equipment.

Every effort has been made to ensure the accuracy of all information in this brochure. However, Bendix Commercial Vehicle Systems LLC makes no expressed or implied warranty or representation based on the enclosed information. Errors or omissions should be reported to: Technical Services, Bendix Commercial Vehicle Systems LLC, 901 Cleveland Street, Elyria, OH 44035 or 1-800-AIR-BRAKE (1-800-247-2725).

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Warnings

WARNING: Improper use of this system could lead to a serious accident. Read this entire Driver Reference Manual before operating the Bendix™ VORAD® EVT-300 Collision Warning System or the Bendix™ SmartCruise® system. Pay particular attention to the safety messages below. This manual should be used in conjunction with proper training.

Limitations of Collision Warning Systems

The Bendix VORAD EVT-300 Collision Warning System is intended solely as an aid for alert and conscientious professional drivers. It is not to be used, or relied upon, to operate a vehicle. The system should be used in conjunction with rear view mirrors and other instrumentation to maintain safe operation. A vehicle equipped with the EVT-300 Collision Warning System should be operated in the same safe manner as if the EVT-300 Collision Warning System were not installed. The system is not a substitute for normal safe driving procedures. It will not compensate for any driver impairment, such as drugs, alcohol, or fatigue.

The Bendix VORAD EVT-300 Collision Warning System may provide little or no warning for some hazards, such as pedestrians, animals, oncoming vehicles, and cross traffic.

WARNING: The system will not sense objects if the sensor view is obstructed. Therefore, do not place objects in front of the system sensors. Remove heavy buildups of mud, dirt, ice, and other materials.

WARNING: Proper alignment is critical to correct operation of the system.

WARNING: Be sure the vehicle is not moving during the initial self-test conducted at vehicle start-up. If the vehicle is in motion, the system may not operate properly. No collision warning system alerts will be given by the EVT-300 system until all lights are extinguished after the self-test is complete.

Bendix™ SmartCruise®

- The Bendix™ SmartCruise adaptive cruise control system works with the cruise control feature of your vehicle. Refer to the cruise control instructions in the Owner's Manual of the vehicle.

- The SmartCruise system will not react to stationary objects, and it does not have the capability to bring the vehicle to a stop.

- The SmartCruise system may operate the engine brake without warning. Do not operate this feature in slippery or wet conditions where sudden braking could cause loss of control.

Vehicle is equipped with an Bendix VORAD SmartCruise system which operates when Cruise Control is on.

⚠WARNING

Improper use of SmartCruise® can lead to a serious accident.
Do not use SmartCruise® in:
 * slippery conditions (wet, snow, ice, mud) or fog.
 * stop-and-go traffic.
 * winding roads.
 * any situation where your vehicle manual advises against using Cruise Control.
   Check front sensor periodically for alignment and cleaning. Heed all safety
   information in your Bendix VORAD manual and truck operator manual

    SmartCruise does not replace an alert, trained driver!

Note the above warning in your vehicle. It is there to remind you of the safe use of the SmartCruise system.

If you have any questions regarding the operation of the EVT-300 or SmartCruise, call 1-800-AIR-BRAKE (1-800-247-2725) in the U.S., Canada, and Mexico; contact your OE dealer in Europe. Bendix wants you to use your VORAD system safely.

Bendix™ VORAD® EVT-300™ Collision Warning System Overview

The Bendix™ VORAD® EVT-300 Collision Warning System is a sophisticated, computerized device that uses forward-looking radar and optional side-looking radar to constantly monitor vehicles ahead and in the blind spot area, respectively.

The collision warning system uses transmitted and received radar signals to determine the distance and relative speed between the vehicle and objects in front. This information is used to warn the driver of potentially dangerous situations through visual and audible alerts. The system can perform in adverse conditions, but objects must be within the field of view of the radar beam and must provide a surface that can reflect the radar beam back for detection.

The optional side sensor is a radar transmitter and receiver mounted on the side of the vehicle to detect objects from two (2) to ten (10) feet (.6 - 3 m) from the side of the vehicle. The side sensor can detect vehicles or objects unseen by the driver, moving or stationary, provided the vehicle or object is moving adjacent to the vehicle.

The EVT-300 system also has the ability to operate in a mode called "SmartCruise". The Bendix™ SmartCruise® system is an optional feature requiring installation by the Original Equipment Manufacturer (OEM). This feature is offered as a convenience to the driver in conjunction with the standard vehicle cruise control.

WARNING: This system does not work under all conditions and can be deceived under certain weather types. The driver must stay alert at all times to avoid an accident.

Features

Bendix™ VORAD® EVT-300™ Collision Warning System Features

- Visual display indicating when objects are detected within 350 feet (106 m) in front of the vehicle.
- Audible alerts when the vehicle is closing within one half (1/2) second, one (1) second, and two (2) second following intervals.
- Visual display indicating that an object is in the side sensor detection area.
- Audible alert indicating that an object is detected by the side sensor when the turn indicator is activated.
- Volume control for audible alerts.
- Range control for setting forward object detection distance.
- Headway control to select following interval when using Bendix™ SmartCruise®.
- Warnings for stationary and slow moving objects.
- Visual and audible proximity alerts.
- Audible alerts are disabled when brakes are applied if the vehicle is more than one half (.5) seconds away from the host vehicle or when the vehicle is going faster than the host vehicle.
- Automatic adjustment of display intensity to accommodate ambient light conditions.
- Simultaneously tracks up to 20 moving or stationary objects within its range.
- Warnings indicating absence of the optional Driver Identification Card.
- Warning indicating a system or component failure.
- Data storage for accident reconstruction.
- Self troubleshooting every 15 seconds.

Bendix™ VORAD® EVT-300™ System Components

The Bendix™ VORAD® EVT-300™ Collision Warning System is comprised of four main components: the Antenna Assembly, Central Processing Unit, Driver Display Unit, and the Interconnecting Harness. Two components, the side sensor and side sensor display, are optional. Each of the components are shown in their approximate location on a vehicle (see Figure 1 below), and their functions are described in the following paragraphs.
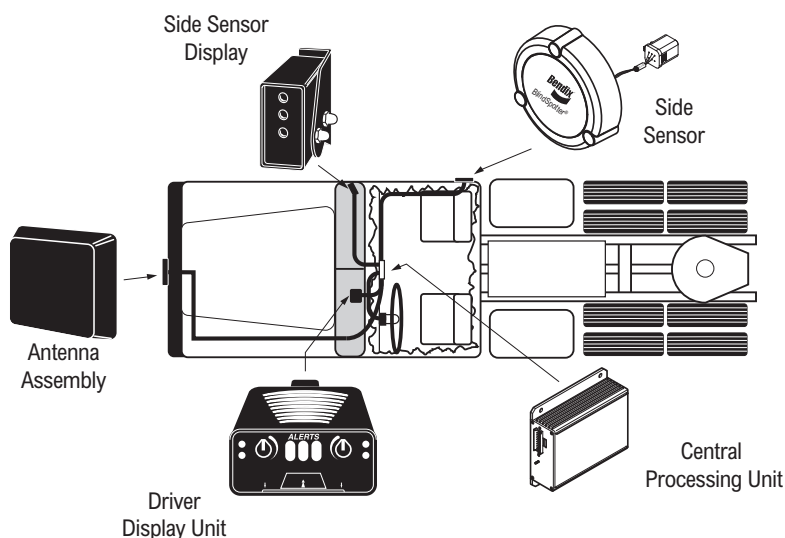

Figure 1

Antenna Assembly

The Antenna Assembly located on the front of the vehicle, transmits and receives low power, high frequency radar signals. The transmitted radar signals are reflected off objects in front of the vehicle and are received back at the Antenna Assembly. The Antenna Assembly compares the difference between the transmitted and received signals; converts this information into a digital format; and transmits it to the Central Processing Unit (see page 6) for additional processing. The Antenna Assembly is usually mounted in the center of the bumper. This mounting location ensures that the radar beam is aimed directly in front of the vehicle. The Antenna Assembly simultaneously monitors up to 20 objects within a 350 feet (106 m) range, whether moving or stationary.

Component Description

Central Processing Unit

The Central Processing Unit (CPU) is the electronic control unit for the Bendix™ VORAD® EVT-300™ Collision Warning System. The CPU and Antenna Assembly are programmable through a slot located in the opposite end from the cable connection on the CPU (system parameters can be set with a Pro-Link™ Diagnostic Tool or ServiceRanger 2.8). The CPU compiles information from the Antenna Assembly, Engine Control Unit, Speedometer, optional Side Sensor (see page 7), Brake, and Turn Signal Circuits to produce audible and visual warnings.

The CPU can be located in a variety of places, depending upon the orientation of the CPU inside the vehicle in which it is installed. Typical locations are on the vehicle firewall, underneath the dashboard, or behind the driver's seat.

Driver Display Unit

The Driver Display Unit contains controls and indicators related to system operation. The Driver Display Unit controls system power-up, speaker volume, range for vehicle warnings, and headway thresholds for the Bendix™ SmartCruise® system. A slot is also provided at the front bottom edge of the Driver Display Unit to insert the optional Driver Identification Card (see page 15). Driver Display Unit indicator lights illuminate to indicate system power, system failure, absence of the Driver Identification Card, SmartCruise system enabled, and multiple stages of warning levels.

A light sensor in the face of the Driver Display Unit adjusts indicator brightness with changes in ambient light. The Driver Display Unit also contains a small speaker that provides audible alert tones. The alert tones are sounded when the vehicle is closing on an object, or if an object is detected by the Side Sensor and the turn signal is activated for a lane change. Additionally, the speaker provides informational tones such as volume level, system failures, and the Driver Identification Card related tones.

The Driver Display Unit mounts on top of, or is recessed in, the dashboard in an area that is easily visible and accessible to the driver.

In certain applications there may not be a Driver Display Unit installed. The information that is normally displayed on the Driver Display Unit may be included on an OEM-installed integrated dashboard display. Consult the OEM literature for each of these integrated systems for proper operation.

Side Sensor (Optional)

The Side Sensor is also a radar device that senses objects from two (2) to ten (10) feet (.6 - 3 m) from the side of the vehicle in a blind spot area on either side of the vehicle. This information is provided to the Central Processing Unit for processing; to activate the illumination of appropriate indicator lamps; and to sound appropriate alarms. Side Sensor(s) are generally mounted on the right side of the vehicle, at or near a blind spot area (see figure 2). The vehicle can be configured to have a Side Sensor on each side, left or right, or with two sensors located on the same side.

Side Sensor Display (Optional)

The Side Sensor Display contains red and yellow indicator lights that denote whether or not the Side Sensor is detecting an object. The yellow indicator light is illuminated when there is no object within the Side Sensor detection zone. When the Side Sensor detects an object, the red indicator light illuminates and the yellow indicator light goes off. The red light also illuminates when the Side Sensor has failed. The red and yellow lights may both illuminate simultaneously during system start-up, and in certain heavy rain conditions. The Side Sensor may not be able to detect objects in heavy rain. A light sensor in the Side Sensor display adjusts indicator brightness with changes in ambient light.

The Side Sensor Display is generally mounted to the right side A-pillar (see figure 2) on the inside of the vehicle, easily visible by the driver, and usually along the same line-of-sight as the side mirror.
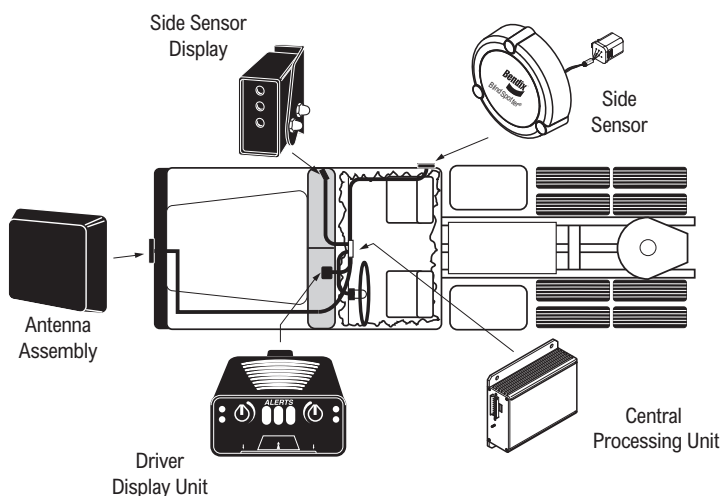

Figure 2

Controls Overview

Bendix™ VORAD® EVT-300™ System Controls

Driver Display Unit

All controls for the Bendix VORAD EVT-300 Collision Warning System are located on the Driver Display Unit, or on the dash if your vehicle has an integrated display. System controls and indicators are located on the Driver Display Unit. The optional Side Sensor Display indicates the status of the optional Side Sensor.

Controls and indicators for the Driver Display Unit are shown below (see figure 3) and described on pages 9 through 13. Indicators for the Side Sensor Display are shown below (see figure 4) and described on page 14.
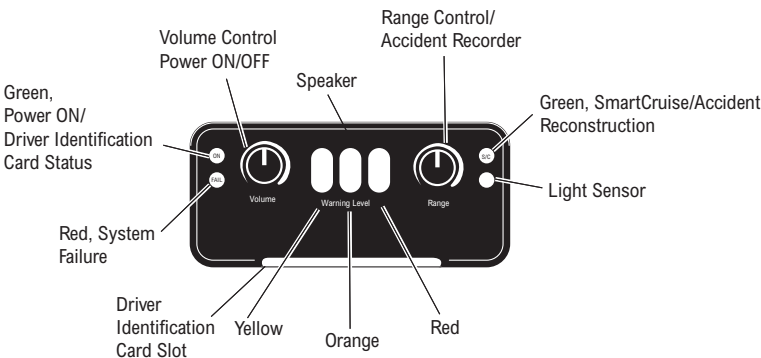
Driver Display Unit

Range Control/
Accident Recorder

Volume Control
Power ON/OFF

Speaker

Green,
Power ON/
Driver Identification
Card Status

Green, SmartCruise/Accident
Reconstruction

ON

SVC

FAIL

Volume   Warning Level   Range

Light Sensor

Red, System
Failure

Driver
Identification   Yellow
Card Slot

Orange   Red

Figure 3

Side Sensor Display Unit (Optional)

Red,
Vehicle Detected
Indicator Light

Light Sensor

Yellow,
No Vehicle Detected
Indicator Light
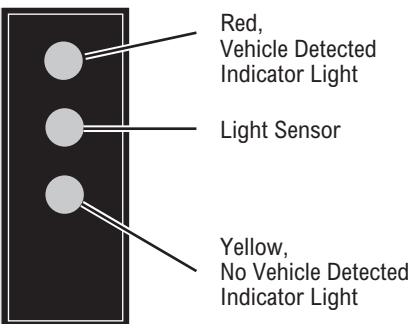
Figure 4

Driver Display Indicators

Range Control/
Accident Recorder

Volume Control
Power ON/OFF

Speaker

Green,
Power ON/
Driver Identification
Card Status

Green, SmartCruise/Accident
Reconstruction

Light Sensor

Red, System
Failure

Driver
Identification
Card Slot

Yellow

Orange

Red

Figure 5

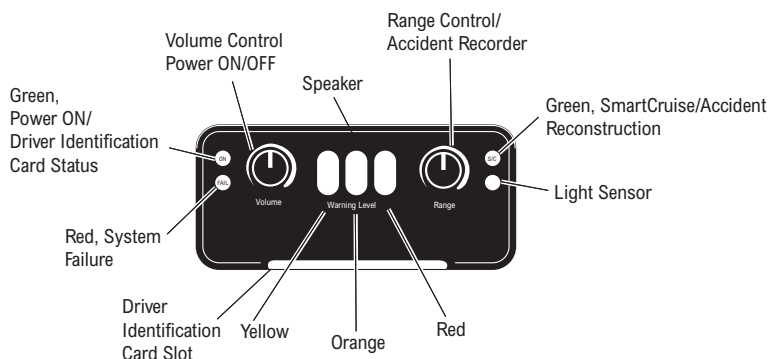| Item	Description
Green, Power-On/ Driver's Identification Card Status*	*Illuminates after power is applied to the system and the power-on self test (described on page 16) is complete. The green "ON" light may blink continuously if the Driver's Identification Card is not installed, (the Driver ID Card is an optional feature) and card alarm might be enabled*. (See Figure 5)*
Volume Control* and Power On/Off	*When pushed in until a distinctive click is heard and/ or felt, this turns the power on or off* if enabled. Adjusts the volume of the Driver Display Unit speaker if enabled. Activates "Failure Display Mode" when the knob is pressed in and held for eight (8) seconds and then released. (See Figure 5)*
Speaker	*Located under the top cover of the Driver Display Unit. Sounds audible tones to alert the driver of a possible hazard. May be set to limit the volume to a minimum level*. (See Figure 5)*

NOTE: *Items marked with an asterisk (*) can be changed (configured), by a Technician, by using ServiceRanger 2.8, a PC-based service support tool.*

Driver Display Indicators

Range Control* and Accident Recorder*	When rotated from minimum to maximum*, and not in Bendix™ SmartCruise® system*, this control knob provides range adjustment of the first alert (2 to 3 seconds) and the second alert (1.75 to 2 seconds). Function may be configured to prevent range adjustment control* (See Figure 5). When the SmartCruise system is selected, rotation of the knob, from maximum to minimum, will change the following interval from 2.25 to 3.25 seconds. Accident reconstruction is initiated by pushing and holding this knob for five (5) seconds, thereby freezing the most recent event data in half of the allocated memory. (See "In Case of an Accident" page 26). (See Figure 5)
Red, System Failure	Illuminates when a problem has been detected in the forward looking radar system. A pattern of flashes blink out the faults that are stored in memory when activated by holding in the volume control knob for five seconds (See "Diagnostic Features", page 27). (See Figure 5)
Green, Bendix™ SmartCruise®*/ Accident Reconstruction*	Comes on when the SmartCruise system is enabled and vehicle cruise control has been engaged. If Accident Reconstruction* has been initiated to store information, it will flash eight (8) times. After system power-up and power-on LED test is completed and if Accident Reconstruction information was previously stored, the display will flash eight (8) times. (See Figure 5)
Light Sensor	Photo sensor senses ambient lighting and adjusts intensity of the indicator lights accordingly, e.g., increases the brightness of the indicator lights during daytime hours and decreases the brightness of indicator lights at night. (See Figure 5)

NOTE: Items marked with an asterisk (*) can be changed (configured), by a Technician, by using ServiceRanger 2.8, a PC-based service support tool.
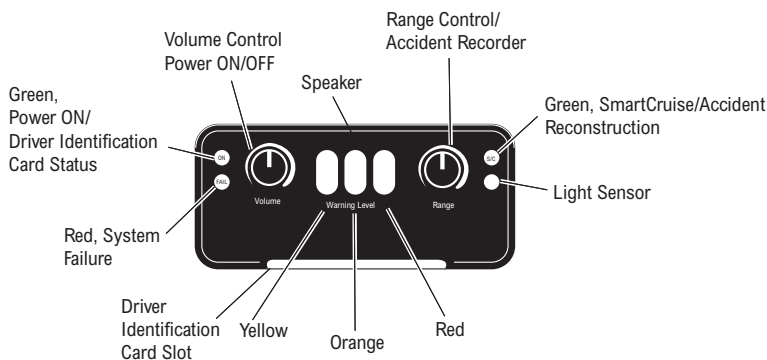
Driver Display Unit

Volume Control
Power ON/OFF

Range Control/
Accident Recorder

Speaker

Green,
Power ON/
Driver Identification
Card Status

Green, SmartCruise/Accident
Reconstruction

Light Sensor

Red, System
Failure

Volume

Warning Level

Range

Driver
Identification
Card Slot

Yellow

Orange

Red

Figure 6

CWS Alert Warning Levels

EVT-300 CWS ALERTS VORAD

Driver Display Unit

Lights	Tones	Description (Range knob full clockwise)
		Object detected
	♪	Proximity alert at less than 2 MPH
		2-3 second following
	♪	1-2 second following, tone as target vehicle slows
	♪♪	0-1 second following, tone as target vehicle slows (continuous tone within 1/2 second). Also, stationary or slow moving vehicle

Side Sensor Display

	♪♪	Object detected, tones will sound if turn signal is on.
		No object detected, <u>proceed with caution.</u>
		Heavy rain detected, no alerts provided

See Driver Reference Manual for details.

Figure 7

Driver Display Indicators

Warning Level Descriptions

- Warnings are received only on a vehicle in your lane.
- Range is reduced on curved roads.
- Warnings are disabled in sharp turns and **when the brake is applied**.
- The distances and times below are based on setting the Driver Display Unit "RANGE" knob to maximum.

As you approach a slower vehicle ahead:

- At 350 ft. (106 m) to the vehicle, the yellow indicator illuminates;
- At 3 seconds to the vehicle, the yellow, orange indicator illuminates;
- At 2 seconds to the vehicle, the yellow, and orange indicators illuminate and a single beep will sound;
- At 1 second, to the vehicle, the yellow, orange, and red indicators illuminate, accompanied by a double beep; and
- At 0.5 seconds to the vehicle ahead, the three indicators illuminate and the beeps will be continuous.

If a faster moving vehicle pulls into your lane and accelerates away:

- If less than 0.5 seconds away, the three indicators illuminate with continuous beeps;
- At 0.5 to 1 second away, three indicators illuminate and no beeps;
- At more than 1 second away, the red indicator will go out;
- At 3 seconds away, the orange indicator will go out; and
- At 350 ft. (106 m), the yellow indicator will go out.

Proximity Alert

If your vehicle rolls very slowly (less than 2 MPH (3 km/h)) toward any stationary object – or if a vehicle in front rolls back toward your vehicle – the yellow indicator lights and a warning double beep sounds when the forward vehicle is within 15 ft. (4.5 m).

Stationary Object

If a stopped vehicle is within 220 feet (67 m), a warning tone sounds and all three lights illuminate when less than 3 seconds away.

Slow Moving Object

If a vehicle ahead is moving 20% slower than your vehicle and is within 220 feet (67 m), a warning tone sounds and all three lights illuminate when your vehicle is less than 3 seconds away.

Miscellaneous Tones

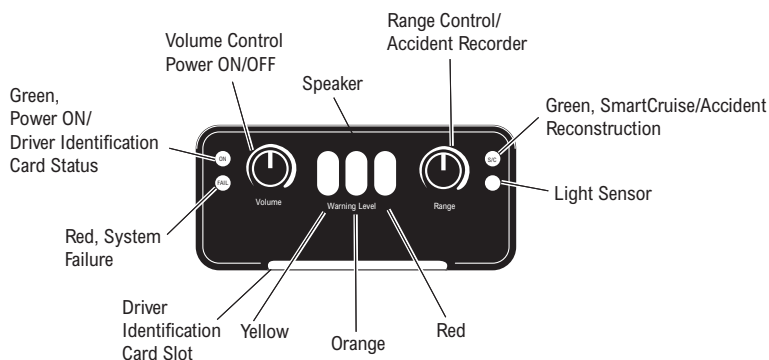| Light/Tones	Description
Fail Light, One Low Tone	*Sounds when the system diagnostics detects a failure.*
One Tone	*Each time the volume control is turned, a single tone is sounded.*
Double Tone	*Driver Identification Card is successfully read when inserted into the slot.*
One Low Tone	*Driver Identification Card is unsuccessfully read when inserted into the slot.*
Flashing On Light, One continuous Tone (Configurable)	*Repeats if the Driver Identification Card is required and is not inserted.*

Driver Display Unit

Figure 8
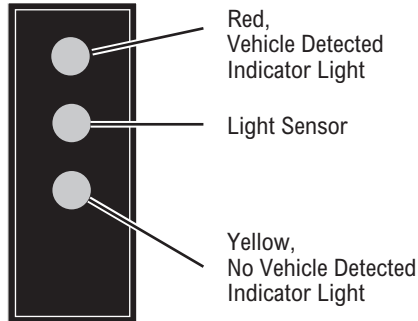
Side Sensor Indicators

Side Sensor Display Indicators

Red,
Vehicle Detected
Indicator Light

Light Sensor

Yellow,
No Vehicle Detected
Indicator Light

Figure 9

Light/Tones	Description
Red/Triple Tone	*Indicator light illuminates after objects have been detected by the Side Sensor(s), and remain in proximity for more than one (1) second. When the right turn signal is activated and the Side Sensor detects an object, the red indicator light illuminates, and the Driver Display Unit speaker sounds a triple tone. **The Tone is sounded only once per activation of the turn signal.** (See Figure 9)*
Light Sensor	*The photo sensor senses ambient light and increases the brightness of the indicator lights during the daytime hours and decreases the brightness at night. Takes ten seconds to activate. (See Figure 9)*
Yellow	*Indicator light stays on when no objects are detected by the Side Sensor(s). (See Figure 9)*
Red and Yellow	*Indicates the Side Sensor is performing a start-up self-test or there is a failure. (See Figure 9)*

Driver Identification Card

If the system configuration requires a Driver Identification Card, (see Figure 10), it must be inserted into the slot provided on the front of the Driver Display Unit (see Figure 8, page 13). After the system is powered on, insert the Card into the slot with a smooth, steady, continuous motion. Allow approximately one (1) second to ensure the bar code is read. A high-pitched confirmation tone will sound when the card is correctly scanned. *The card should be removed and stored in a safe place until required again.* If the bar code is not scanned correctly, the system will sound one low-pitched tone.

If the Card is not installed into the slot in the Driver Display Unit, when required, two events can occur: the green "ON" light will flash continuously; or the green "ON" light will flash continuously accompanied by a matching audible tone. This is a configurable option.

Driver Identification Card (Optional)

Figure 10

Initial Start-Up

Bendix™ VORAD® EVT-300™ System Start-Up

WARNING: Be sure the vehicle is not moving during the initial self-test conducted at vehicle start-up. If the vehicle is in motion, the system may not operate properly. No collision warning system alerts will be given by the EVT-300 system until all lights are extinguished after the self-test is complete.

1. The EVT-300 system powers up when turning the vehicle ignition key to the run position. All Driver Display Unit and Side Sensor indicator lights will illuminate and stay on until the self-test is complete.
2. If the green "ON" indicator is flashing, insert the Driver Identification Card (see page 15) into the Driver Display Unit so the system can identify the driver of the vehicle.
3. If the green "S/C" (Bendix™ SmartCruise®) light flashes eight (8) times after the self-test is completed, an accident reconstruction event has been stored in the system memory. The light will continue to flash eight (8) times during every start-up until the event is cleared. Notify your management to assist you with this procedure. If the event has been stored in error, the system software should clear the system in 30 days.
4. If the "FAIL" indicator light (or headway control failure) illuminates and stays on after the self-test or while driving, a component or system failure has occurred. This may render the Bendix™ VORAD® system inoperable. If the Bendix™ SmartCruise® option is enabled and a failure occurs, the SmartCruise system will no longer function (see page 25) until the fault has been corrected and the ignition switch has been turned OFF and then back ON. Collision warning lights and tones may still work correctly when the SmartCruise system failures occur that are brought on by a component or system failure.

## Bendix™ VORAD® EVT-300™ System Vehicle Tracking

Straight Ahead Same Lane Tracking

The system's same-line target discrimination capability eliminates detection of nuisance objects in adjacent lanes.

Detected but not alerted

Critical Target

Detected but not alerted
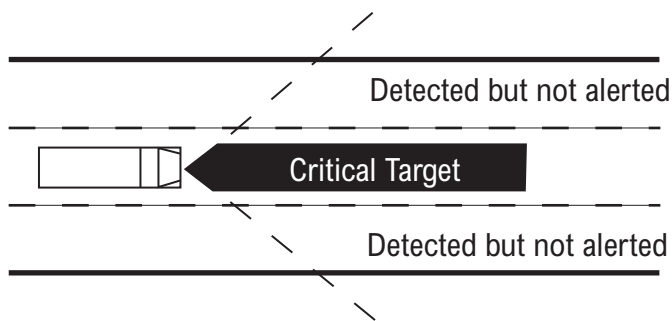
Curved Same Line Tracking

While driving on curved roads, the same lane target discrimination is maintained using the host vehicle turn rate information and vehicle azimuth (angle to object). Due to limitations on the radar's field of view, maximum range is limited in sharp turns.

Detected but not alerted

Critical Target
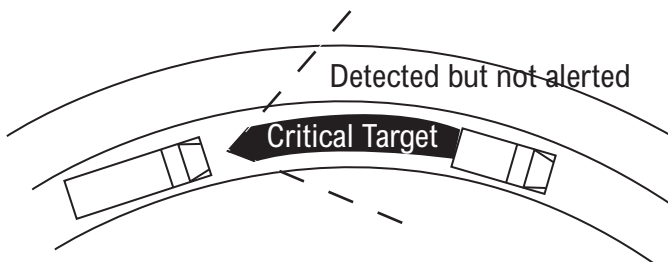
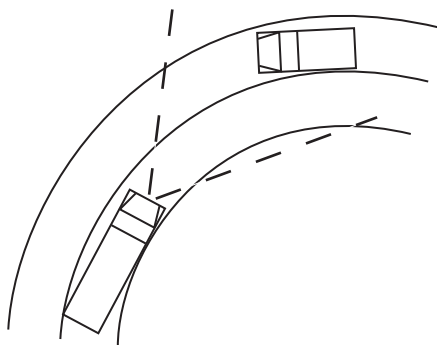## Bendix™ VORAD® EVT-300™ System Road Situations

⚠️ **WARNING:** The Bendix VORAD EVT-300 Collision Warning System will not warn of all possible hazards. Do not assume it is "all clear" if no warning signals are indicated. This system is intended solely as a driver aid, and not to be relied upon to operate a vehicle. Use the EVT-300 system in conjunction with rear view mirrors and other instrumentation to maintain safe vehicle operation.

Certain road situations can affect the system's ability to detect objects. Curves, dips, and hills on the road in front of the vehicle can affect detection. The radar system may sound a warning when it detects an object in front of the vehicle even though the driver may be planning to turn away, or stop, prior to reaching the object. What follows illustrates some special road situations that must be taken into account.

Detecting Objects While Vehicle is in a Turn
Audible alarms will not sound with oncoming traffic during very sharp right or left hand turns of less than 750 feet (228 m) radius.

Detecting Objects Alongside an Approaching Curve

When approaching a curve, warnings may sound and indicators may illuminate due to objects – such as a parked car – on the side of a curved portion of the road in direct line with the radar beam, until the vehicle is actually starting into the turn.

Detected but not alerted

Critical Target

Detected but not alerted
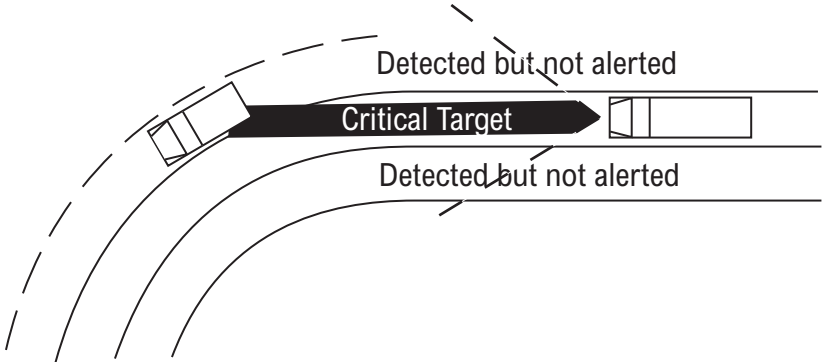
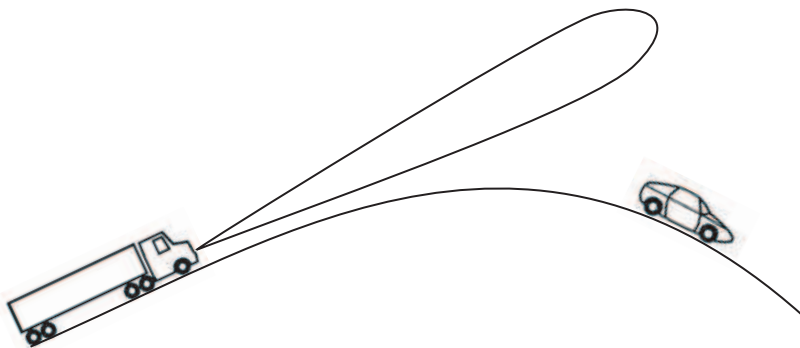**Detecting Elevated Obstacles**

Some unusual road elevation angles may cause the system to detect overhead signs or overpasses.

Special Road Situations

Detecting Vehicles on the Other Side of a Hill
The system cannot detect vehicles over a hill. No audible alarm will sound until objects are within the field of view of the radar antenna.

Approaching a Steep Hill
The system cannot detect objects above its beam. Generally, the alarm does not sound from the beam hitting the road surface.
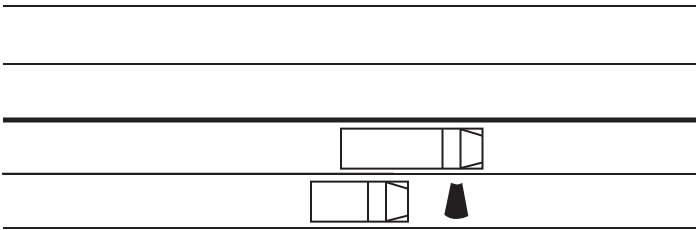
Side Sensor Coverage

Note that the optional Side Sensor(s) only detects object motion within its field of view. This view includes the 2 to 10 feet (.6 - 3 m) next to the vehicle.

Note: Vehicles outside of the field of view will not be detected.

Side Sensor Range

The Side Sensor(s) range is set to detect vehicles in the adjacent lane two (2) to ten (10) feet (.6 - 3 m) away.

Note: When a fixed object maintains a continuous presence along the right side of the vehicle (e.g. guard rails, construction walls, tunnels, bridges, etc.), the "red" light on the optional Side Sensor display may remain illuminated.
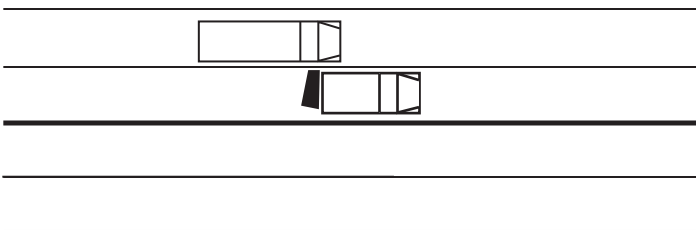
Bendix™ SmartCruise® System (Optional)

Bendix™ VORAD® EVT-300™ SmartCruise® System (Optional)

The SmartCruise system is an optional enhancement to the Bendix VORAD EVT-300 Collision Warning System. The SmartCruise system is activated whenever the vehicle's standard cruise control system is activated and the EVT-300 system is powered on. When the SmartCruise system is active, the green "S/C" (SmartCruise) light in the upper right corner of the Driver Display Unit will illuminate, or a headway control indicator will be evident on an OEM-proprietary messaging center.

The "RANGE" control knob (see Figure 8, page 13) adjusts the Bendix SmartCruise system's "following intervals". The SmartCruise system will either maintain the selected following interval between the host vehicle and a vehicle ahead or, in the case of no target vehicle, the set cruise control speed. The following interval takes precedence over the set cruise control speed.

Listed below are descriptions of the most common situations encountered while using the SmartCruise system.

- **Cruise Control is On and No Vehicle is Detected**

  If no vehicle is present in front of the vehicle (or if present and beyond the range of the EVT-300 system), the vehicle will maintain the speed selected by the cruise control.

- **Cruise Control is On and A Vehicle is Detected**

  The driver can adjust the SmartCruise system following interval from 2.25 to 3.25 seconds if enabled. See the table on next page for the following interval (in seconds) versus the following interval in feet, at various speeds.

⚠ **WARNING:** The Bendix SmartCruise system does not replace an alert, trained driver. The SmartCruise system will not react to stationary objects and cannot bring the vehicle to a complete stop. The driver still needs to use good driving practices to avoid an accident.

Bendix™ SmartCruise® System (Optional)

Following Intervals

Following Interval in Seconds	Following Interval in Feet (m) at 50 MPH	Following Interval in Feet (m) at 55 MPH	Following Interval in Feet (m) at 60 MPH	Following Interval in Feet (m) at 65 MPH
2.25	165 (50)	182 (55)	198 (60)	214 (65)
2.50	183 (56)	202 (62)	220 (67)	238 (73)
2.75	202 (62)	222 (68)	242 (74)	262 (80)
3.00	220 (67)	242 (74)	264 (80)	286 (87)
3.25	238 (73)	262 (80)	286 (87)	309 (94)

Bendix™ SmartCruise® System On

- **Normal Operation**

  As the Bendix™ VORAD®-equipped vehicle approaches a target vehicle in the same line, the VORAD-equipped vehicle will slow to the speed of the other vehicle and maintain the set following distance interval at their speed. The speed reduction may be accomplished by the engine ECM (Engine Control Module) issuing a command to reduce fuel, and engaging the engine retarder.

WARNING: If your vehicle speed and the forward vehicle speed are drastically different, the driver may need to apply the service brakes to maintain a safe distance. As with cruise control, the SmartCruise system must be reset after brakes have been applied.

WARNING: If another vehicle in an adjacent lane cuts in front and continues to the opposite lane, the SmartCruise system may not respond.

Bendix™ SmartCruise® System (Optional)

Cut In and Out
If the speed of the forward vehicle is faster than that of your vehicle, your vehicle will continue to maintain its speed. However, if the speed of the forward vehicle is less than your vehicle's speed, the engine ECM will issue a command to reduce fuel and may also engage the engine retarder. Once the target vehicle moves out of your lane, your vehicle will restore the cruise control speed, or resume the following interval if another forward vehicle is in the lane. Again, the driver may need to apply the service brake to maintain a safe distance. The driver may also depress the acceleration pedal at any time to override the SmartCruise® system.

Cut In and Stay
If a forward vehicle in an adjacent lane cuts in front of your vehicle and remains there, the system will respond by slowing your vehicle to restore the set following distance interval to the forward vehicle. The engine ECM will reduce fuel and may also engage the engine retarder to accomplish this. As stated above, the driver may need to apply the brake to maintain a safe distance.

Vehicle Ahead Changes Lane
When maintaining a following interval to a forward vehicle, and that vehicle moves into an adjacent lane, the system will respond. If there is no other vehicle ahead (or within the range of the system), your vehicle will accelerate to the set cruise speed. If there is another vehicle ahead, your vehicle will restore the following distance interval to that vehicle. As stated above, the driver may need to apply the brake to maintain a safe distance.

The Bendix SmartCruise System and AutoShift™ Transmissions
Under any situation that causes the system to slow the vehicle, and the engine RPM reaches a preset minimum, the vehicle's AutoShift transmission will automatically downshift. Similarly, any situation that causes the vehicle to accelerate and a preset maximum engine RPM is reached, the AutoShift will upshift.

The Bendix SmartCruise System and Manual Transmissions
Under any situation that causes the system to slow the vehicle, and the engine RPM reaches a preset minimum, the engine ECM will disengage cruise control and the driver may need to manually downshift the transmission. If this happens, the vehicle cruise control will need to be re-engaged (Resume or Set) before the SmartCruise system will resume operation.

Bendix™ SmartCruise® System (Optional)

Road Curves and the SmartCruise System

1. **Gentle Curves**

    The SmartCruise system will continue to maintain a set following interval in a gentle curve as long as the turn is greater than 750 feet (228 m) radius.

2. **Sharp Curves**

    When maintaining a set following interval, the system may lose track of the forward vehicle. If this happens, your vehicle will maintain its current speed. When the forward vehicle is again within the view of the EVT-300 system, the SmartCruise system will restore the set following interval. Refer to pages 17 through 21 for "Typical System Tracking" and "Special Road Situations".

Note: The previous paragraphs do not address all the possible driving situations that the vehicle and driver may encounter while in SmartCruise.

SmartCruise System Failure

Cruise Control/SmartCruise System Fails to Operate
Due to the variety of engines available by OEM, the procedure to override this error and return to normal cruise control must come from the engine manufacturer.

Note: The most widely used method among engine manufacturers is to toggle the cruise control on/off switch two (2) times within 10 seconds starting from the "ON" position. If this does not work, please contact your dealership or maintenance personnel.

WARNING: The SmartCruise system is not a substitute for an alert, trained driver. The driver is ultimately responsible for the safe operation of the vehicle and the driver should fully understand the operating characteristics of the SmartCruise system and take all necessary actions to operate the vehicle in a safe manner.

In Case of an Accident

Accident Reconstruction Capability (Optional)

The Accident Recorder can store two segments of system data in the system's non-volatile memory. The first of the two segments may be stored by pushing and holding the "RANGE" knob on the Driver Display Unit for approximately five (5) seconds. Within six (6) seconds, the green "S/C" light will blink eight times, confirming storage of the data (see Figure 11). Subsequent pushing of the "RANGE" knob will cause the system to respond with a "FAIL" tone. After the first segment is frozen, the second segment runs continuously recording system data until the system is powered down.

The system's Central Processing Unit must be returned to Bendix Commercial Vehicle Systems to download and interpret the recorded data in the non-volatile memory. This must be done before 30 days have elapsed, or the event will be removed from the system memory. Before shipping the unit, contact Bendix at 1-800-247-2725. After confirmation, ship the Central Processor Unit to Bendix, Attn: Accident Reconstruction Specialist, 901 Cleveland Street, Elyria, OH 44035.
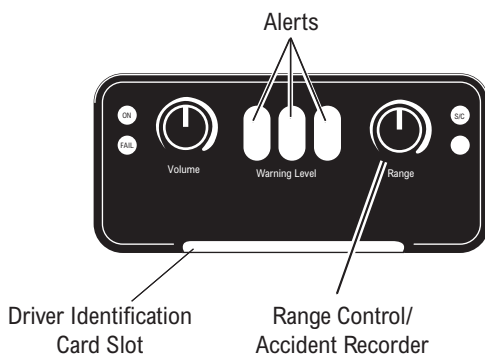

Figure 11

Preventive Maintenance

The only maintenance required should be to keep the Antenna Assembly and Side Sensor clean of heavy buildups of mud, dirt, ice, and other materials that could reduce the range of the system. Antenna alignment should also be checked if any occurrence may have caused it to be misaligned.

 WARNING: The system will not sense objects if the sensor view is obstructed. Therefore, do not place objects in front of the system sensors. Remove heavy buildups of mud, dirt, ice, and other materials.

 WARNING: Proper alignment is critical to correct operation of the system (See BW2863 for Antenna Assembly Alignment procedure).

 WARNING: Be sure the vehicle is not moving during the initial self-test conducted at vehicle start-up. If the vehicle is in motion, the system may not operate properly. No collision warning system alerts will be given by the EVT-300 system until all lights are extinguished after the self-test is complete.

Diagnostic Features

The system performs testing on a continuous basis. Every 15 seconds, the results of these tests are evaluated by the Central Processing Unit to determine whether or not to report a failure. If a failure occurs within the front radar system, the red "FAIL" light on the Driver Display Unit will illuminate continuously as long as the failure is active, and the associated failure code is stored in the Central Processing Unit memory until maintenance personnel are able to check the system.

The Bendix™ VORAD® EVT-300 system can indicate active and inactive fault codes stored in the Central Processing Unit memory when it is placed into its "Failure Display Mode". Inactive fault codes are faults which have occurred and have self-corrected. Active faults are faults that are still present. These fault codes provide the driver the ability to record the system fault during a trip and call either the maintenance department or Bendix Commercial Vehicle Systems for assistance. When placed into its "Failure Display Mode" (see "How to Activate Failure Display Mode" on page 28), specific fault codes are indicated by a pattern of flashes blinked out on the Driver Display Unit's red "FAIL" light indicator.

Failure Display Mode

How to Activate Failure Display Mode

1. Press in and hold the Driver Display Unit "VOLUME" knob for at least five (5) seconds. If the knob is released before five (5) seconds has lapsed, the system will turn off. After five (5) seconds the Driver Display Unit's red "FAIL" indicator light begins to blink out the failures. If there are no faults found, the Driver Display Unit will flash a 41 code. At the conclusion of flashing the fault codes, the system will flash a 41 code.

2. To read active fault codes, position the Driver Display Unit "RANGE" knob to the left of center and only active codes will be sent to the "FAIL" indicator light. Position the Driver Display Unit "RANGE" knob to the right of center and inactive faults will flash the "FAIL" indicator light.

3. Each fault code consists of a two digit number. A pause (approximately 3/4 of a second in duration) separates the blinking of the first and second digit of the fault code. Example: Fault code 22 is indicated by two (2) blinks, a 3/4 second pause, and two (2) more blinks. In this case, the fault code of 22, suspects a faulty "LT Turn Signal". There is a pause of three (3) seconds between each flash code fault. If there are no faults, a code 41 will be flashed.

4. Additional fault codes are blinked out at approximately eight (8) second intervals. After all fault codes have been displayed, a code 41 will be flashed.

Fault Code Chart

Fault Code	Suspect Failure
11	Central Processing Unit
12	Central Processing Unit
13	Driver Display Unit
14	Antenna Assembly
15	Right Side Sensor
16	Left Side Sensor
21	Right Turn Signal
22	Left Turn Signal
23	Brake Input
24	Speed Input
25	SmartCruise Compatibility
31	J-1587
32	J-1939
33	VBUS
34	Driver Display Unit
35	Antenna Assembly
41	No Fault or End of Fault Codes

Report any failures indicated by the Driver Display Unit or Side Sensor Display to maintenance personnel for service. If the red "FAIL" indicator light comes on while driving, turn the system off (if available), and do not use until it has been repaired.

Side Sensor failures will illuminate either the red or yellow lights on the Side Sensor Display. The lights will remain illuminated as long as a failure is detected.

If you have any further questions regarding the Bendix™ VORAD® system, call 1-800-247-2725 in the U.S., Canada, and Mexico; contact your OE dealer in Europe.

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